

POWER ASYMMETRIES IN ECOSYSTEM SERVICES GOVERNANCE: INSIGHTS FROM SOCIAL NETWORK ANALYSIS

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Understanding how power asymmetries arise and how they can affect policy outcomes are crucial questions for ecosystem services (ES) research. In political sciences and sociology, the distribution of power among individuals has been widely studied with social network analysis (SNA). SNA have also been used to understand natural resource governance, for example in the context of fisheries, REDD+ or urban green areas. In this paper, we propose to analyze the structure of social networks of influence and domination related with ES governance in the Mariño watershed (Peru). The objectives of this paper are (1) to propose a framework for analyzing power asymmetries in relation with ES governance and (2) to apply it to the study case to highlight power differentials between selected stakeholders from different sectors and scales. We conducted face-to-face semi-structured interviews with representatives of 52 stakeholders of the watershed to understand how they relate with each other. For the influence network, we specifically asked them to identify the stakeholders with whom they exchange information, collaborate for projects, have regular and unregular meetings, do business with. In contrast, for the network of domination, we asked them to identify the stakeholders they restrict, punish, advice, or supervise, as well as the stakeholders that have such control over them. We assessed degree, closeness and betweenness centralities of the two networks. Four categories of stakeholders were distinguished depending on stakeholder's levels of influence and domination. Stakeholders from local scale, business and civil society showed significantly lower levels of both influence and domination than other stakeholders. Power was significantly correlated with the benefits received and participation to ES management: ES managers showed higher levels of power, and were found in the core of the two networks. These power asymmetries raise issues of equity and might reduce the adaptive capacity of the social-ecological system.



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Power asymmetries in ecosystem services governance: insights from social network analysis

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A photograph of a high-altitude landscape. In the foreground, there is a blue lake or wetland area with patches of yellow grass. Two llamas are visible: one in the middle ground standing in the water, and another further back on a grassy bank. The background shows a steep, rocky hillside under a clear sky.

Power asymmetries in the governance of ES

- ES governance is profoundly linked with issues of power and equity
(Ernstson 2013, Berbés-Blázquez et al. 2016, Chaudhary et al. 2018)
- ES research poorly related to the questions of equity, power and environmental justice
(Ernstson 2013; Felipe-Lucia et al. 2015)
- Methods are needed to better understand inequities and power asymmetries in relation to ES
(Barnaud et al., 2018, Chaudhary et al., 2018, Sikor, 2013)



Power in sociology

- Power is “the ability to affect outcomes or get things done”

(Brass and Burkhardt 1993 p. 441)

- Can be exerted over things or people

(Dahl 1957, Giddens 1979)

→ Relational concept, not inherent to individuals or groups

- Different forms of power
 - Influence (reward, friendship, etc.)
 - Domination (coercive, legitimate, etc.)

(French and Raven 1959, Parsons 1963, Knoke 1994)



Power in sociology

- Typology of the different forms of power:

		INFLUENCE	
		Absent	Present
DOMINATION	Present	Coercive Power	Authoritative Power
	Absent	Egalitarian "Power"	Persuasive Power

Knoke, 1994



Social Network Analysis (SNA) to analyze power asymmetries

- Social network analysis to describe power in organizations

(Cook 1983, Brass 1992, Knoke 1994)

- Network centralities to measure power

(Brass 1992, Knoke 1994, Mills et al. 2014)

- Some applications of SNA to natural resource and ES governance

(Ernstson et al. 2008, Bodin and Crona 2008, Cohen et al. 2012)

→ Not focused on power distribution !

Questions

- How to conceptualize and quantify power using SNA?
- What are the power asymmetries related to the governance of ecosystem services in the real world?
 - Who are the powerful stakeholders?
 - On whom do they exert their power?
 - What are the consequences in terms of conflicts?



Study Site

- Andean watershed (Mariño), Peru
- 284 km²
- Agroforest mosaics
- Presence of a protected area (Ampay Sanctuary)
- Environmental conflicts (water scarcity, urbanization boom, mining activities)



Methods

Workshops

- Selection of ecosystem services
- Identification of stakeholders



Methods

Workshops

- Selection of ecosystem services
- Identification of stakeholders



52 interviews

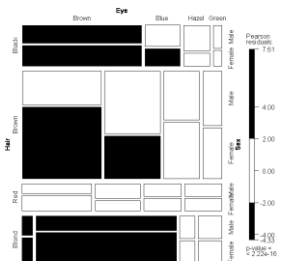
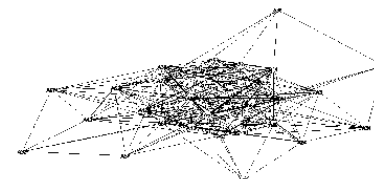
- With who are you exchanging information? Working on common project?
- Who are you supervising ? Controlling?
- With who do you have conflicts?



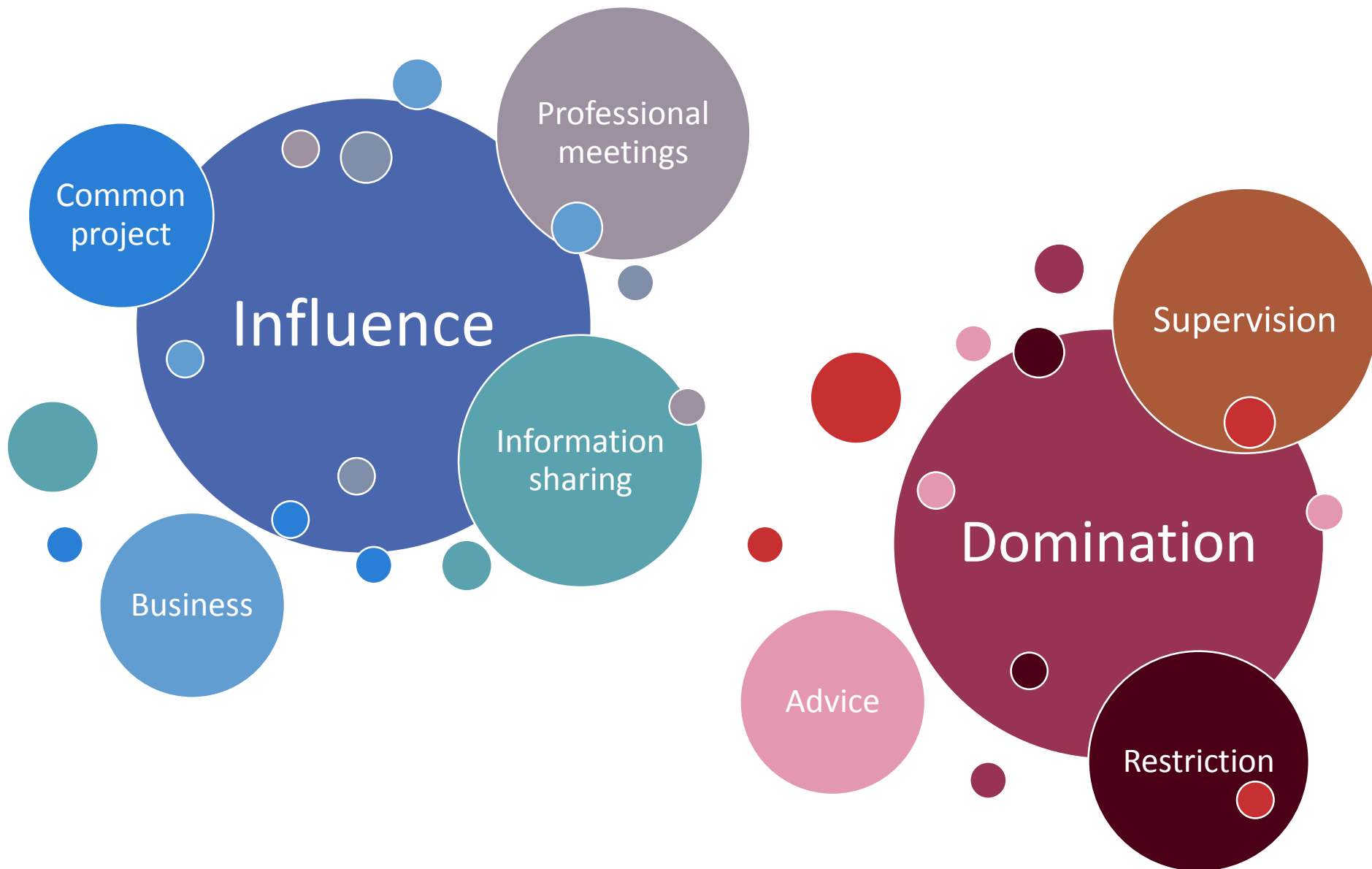
Analysis

- Retranscription and coding of relational information
- Network analysis
- Statistical tests

	A	B	C
A	-	X	X
B	✓	-	✓
C	✓	X	-



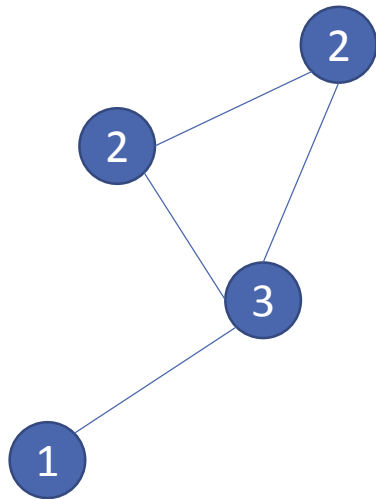
Relationships considered in the analysis



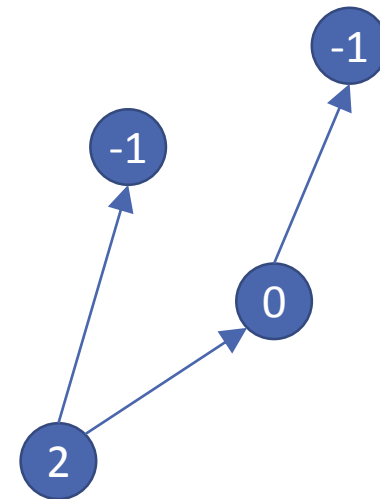
Proxys for influence and domination

Degree centrality: Number of ties that lead into or out of a node. Describes the number of person that can be reached.

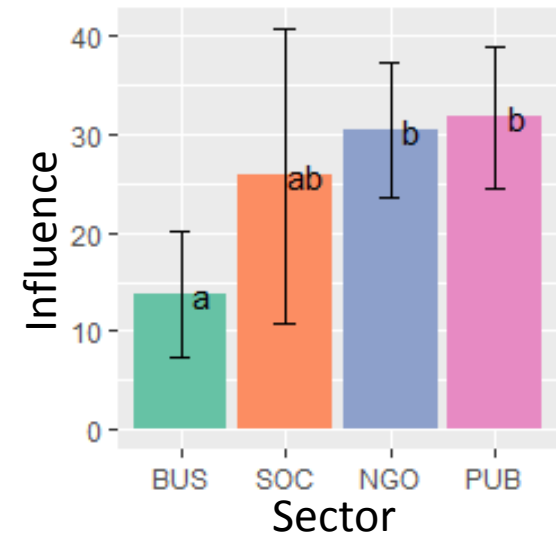
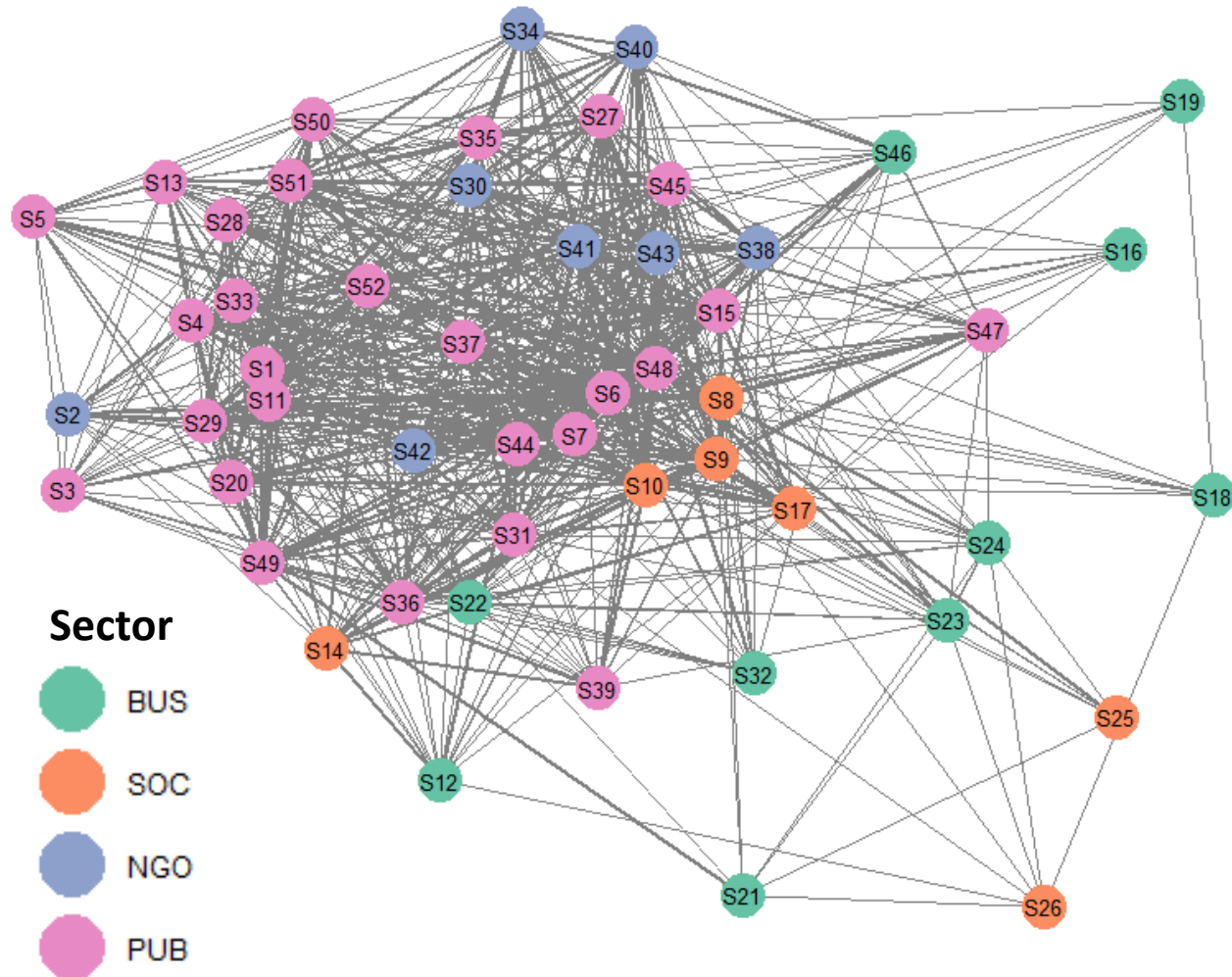
Influence: Degree



Domination: Outdegree-Indegree

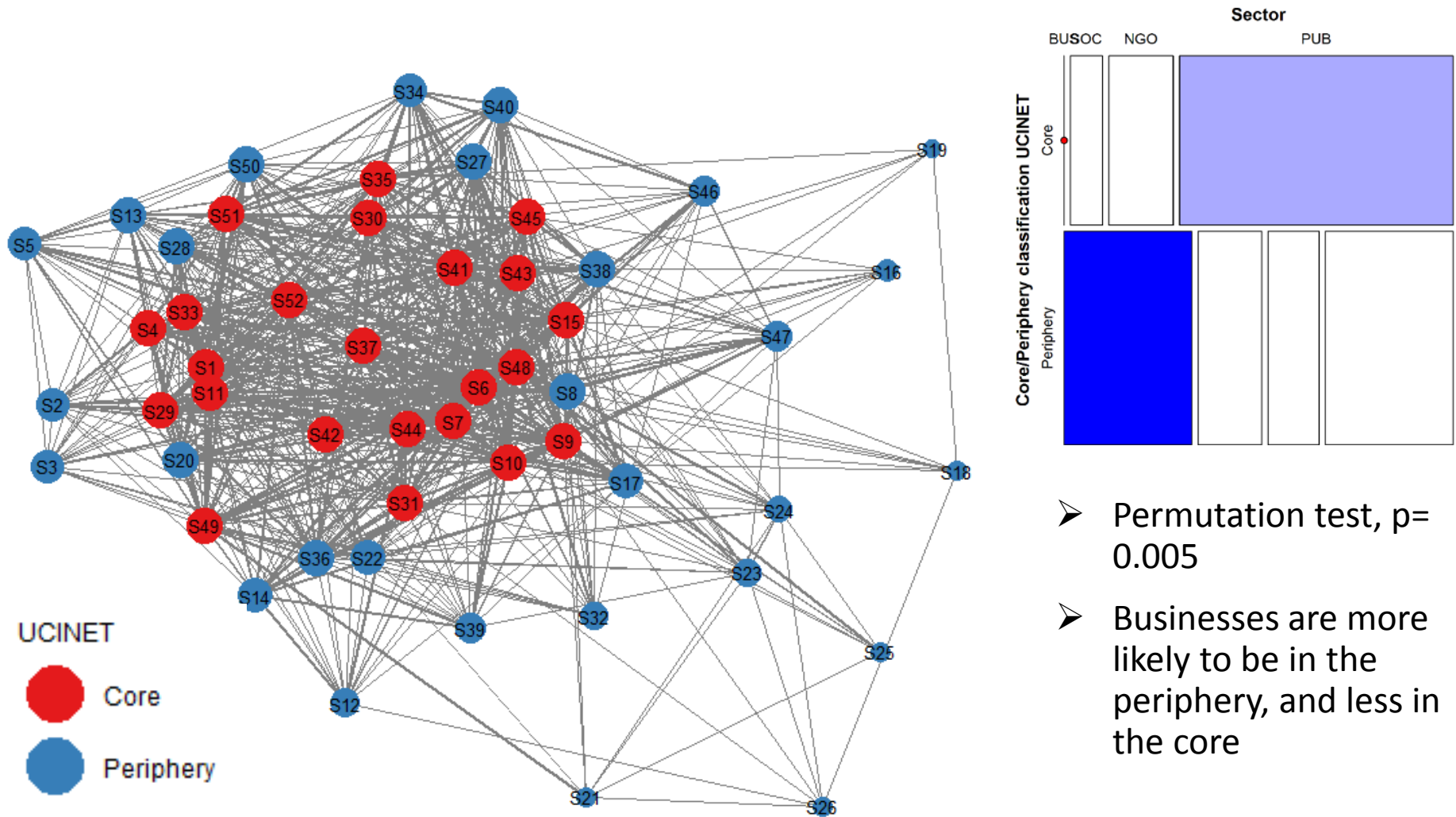


Public sector and NGOs are more influential

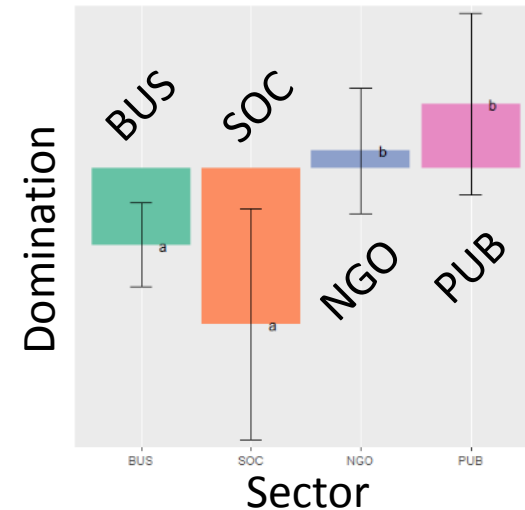
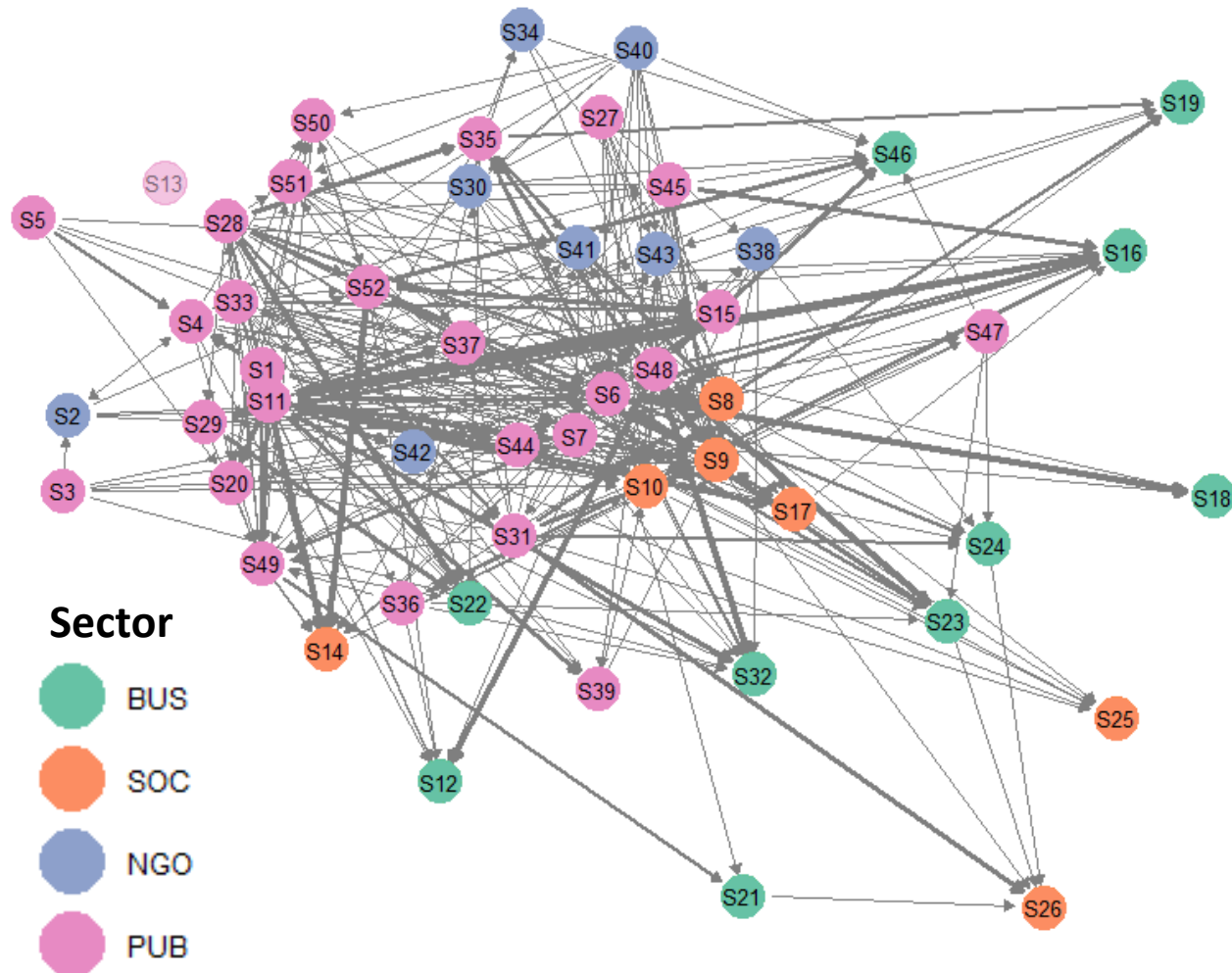


➤ Permutation test,
 $p < 0.001$

Public sector is in the core of influence network



Public sector and NGO are more dominant...



➤ Permutation test, $p < 0.001$

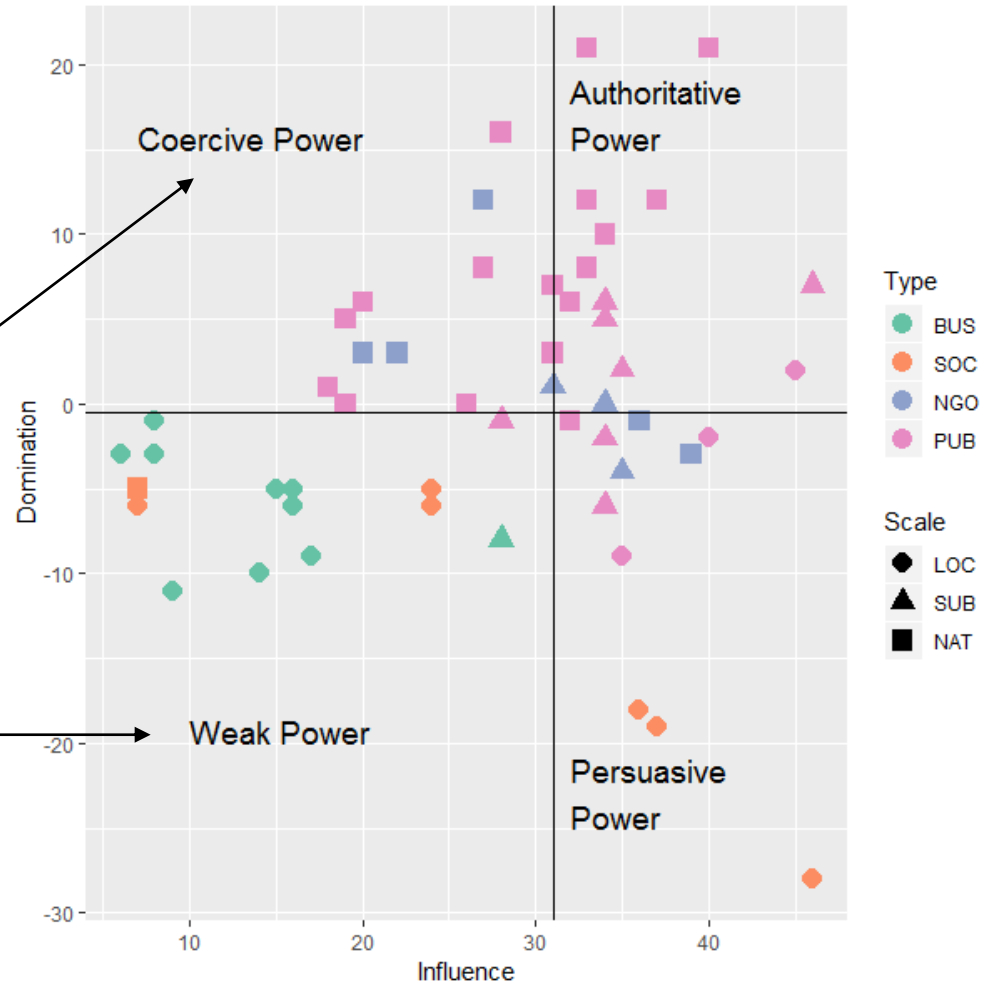
- Domination also increases with scale (permutation test, $p < 0.001$)
- No significant core/periphery patterns

Different forms of power

- Stakeholder characteristics differ among groups (permutation tests, $p < 0.05$)

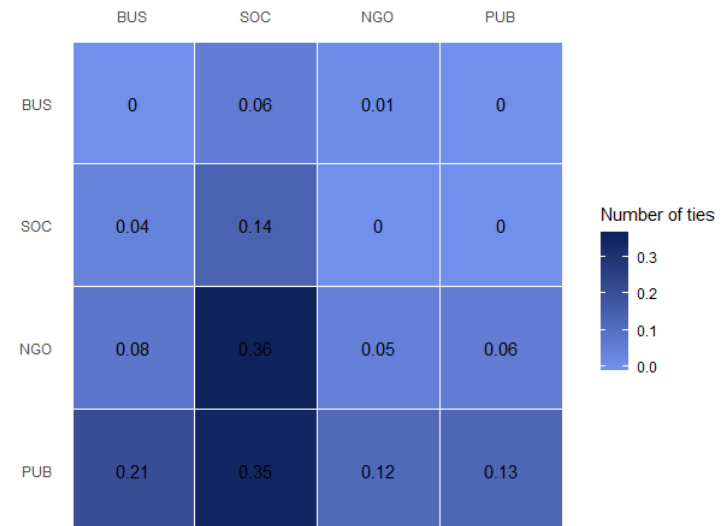
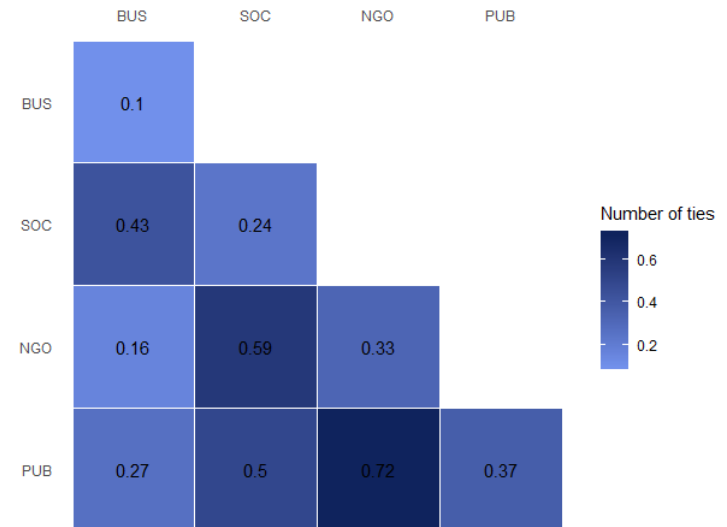
+ national stakeholders
- local ones

+ businesses and civil society;
local stakeholders
- public sector;
national stakeholders



Who exerts power over who?

- Intense influence relationships between:
 - NGO and public sector
 - NGO and civil society
 - Public sector and civil society
- Intense domination happens from:
 - NGO to civil society
 - Public sector to civil society and businesses
- Differences between scales



Power asymmetries lead to conflict

- Logit regressions
- Some types of relationships are more likely to lead to conflicts (p-value <0.05)
- But also differentials in domination
- Good predictive ability

Variable	Estimate	Signif.
Intercept	-2,24	***
Difference in influence	8,2 10 ⁻³	
Difference in domination	4,4 10⁻²	*
Common project	0,41	
Regular professional meetings	2,51 10 ⁻²	
Unregular professional meetings	1,19	**
Information sharing	0,44	
Business	1,60	**
Restriction	1,35	**
Advice	5,4 10 ⁻²	
Supervision	1,11	**

Significance codes ***: 0,001 **: 0,01 *: 0,05



Conclusions

- Social network analysis is an interesting tool to highlight power asymmetries
- Powerful stakeholders are mainly from public sector and national scale
 - Limit the representation of other stakeholders in the governance of ES (equity issue)
 - Reduce the adaptive capacity of the system (adaptation issue)
 - Generate mistrust in institutions that manage natural resources (legitimacy issue)
- Power asymmetries generate conflicts (social unrest issue)
- Some effects will be analyzed more in detail with Exponential Random Graph Models

If you have questions or comments on this presentation:

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attention!**

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